Application No. 09/524,227
Docket No. 13DV-13004
Amendment dated January 16, 2004
Reply to Office Action of September 16, 2003

Amendments to the Specification:

Please replace the paragraph at line 1 of page 5 with the following amended paragraph:

According to the invention, an aluminide bond coat having generally columnar grains is recrystallized to eliminate the original grain boundaries throughout the bond coat or at least adjacent the bond coat surface. In so doing, more stable (preferably equiaxial) grains are created at the bond coat surface where the critical alumina-bond coat interface will exist following oxidation of the bond coat and/or deposition of TBC on the bond coat. In addition, the original surface texture of the bond coat is altered to be smoother where grain boundaries meet the bond coat surface, and the diffusion zone of the bond coat may be modified so that refractory phases originally present at the interface between the additive layer and diffusion zone of the bond coat ~~bond cot~~ are no longer at the grain boundaries.

Please replace the paragraph at line 25 of page 10 with the following amended paragraph:

During an investigation leading to this invention, superalloy specimens

were coated with a TBC system of the type shown in Figure 2. The superalloys were RENÉ ~~René~~ N5 with a nominal composition in weight percent of Ni-7.5Co-7.0Cr-6.5Ta-6.2Al-5.0W-3.0Re-1.5Mo-0.15Hf-0.05C-0.004B-0.01Y, and RENÉ ~~René~~ R142 with a nominal composition in weight percent of Ni-12Co-6.8Cr-6.35Ta-6.15Al-4.9W-2.8Re-1.5Mo-1.5Hf-0.12C-0.015B. The ceramic topcoat was YSZ deposited by EBPVD, while the bond coats were single and two-phase PtAl deposited by VPA or CVD. The specimens were furnace cycle tested (FCT) at 2075°F (about 1135°C) at one-hour cycles to spallation, and then examined for appearance of the fracture mode that caused spallation. Observations made with these specimens suggested that spallation was brought on by a mechanism that involved convolution of the oxide scale 36, as portrayed in Figure 3. The convolutions were observed to typically initiate at the grain boundaries 34, and to further develop with oxide growth. Distinct valleys 38 formed as a result of the scale convolution eventually reached a critical depth/width ratio, at which point the scale 36 was bent at nearly a 90 degree angle (Figure 4, which is a detailed view of the region identified in Figure 3 by the reference number 4). As shown in Figure 5, a crack 40 eventually formed in the scale 36 and typically propagated into the bond coat/oxide scale interface.